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ART. VIII.—1. *Report of the Secretary of War, on the several Pacific Railroad Explorations, and accompanying Documents, consisting of,—I. Examination by Captain A. A. Humphreys, Topographical Engineers, of the Reports of the Explorations to determine the most practicable and economical Route for a Railroad from the Mississippi River to the Pacific Ocean.—II. Memoranda by Captain George B. McClellan, Corps of Engineers, upon some practical Points connected with the Construction and Working of Railways.—III. Letter of Major General Jesup, Quartermaster-General U. S. A., upon the Cost of transporting Troops and Supplies to California, Oregon, New Mexico, &c.—IV. Report of Governor I. I. Stevens upon the Route near the 47th Parallel.—V. Report of Lieutenant E. G. Beckwith, 3d Regiment of Artillery, upon the Routes near the 41st and 38th Parallels.—VI. Report of Lieutenant A. W. Whipple, Topographical Engineers, upon the Route near the 35th Parallel.—VII. Report of Captain John Pope, Topographical Engineers, upon that Portion of the Route near the 32d Parallel from Preston to the Rio Grande.—VIII. Report of Lieutenant John G. Parke, Topographical Engineers, upon that Portion of the Route near the 32d Parallel from the Rio Grande to the Gila.—IX. Extract from the Report of Major W. H. Emory, Topographical Engineers, of a Military Reconnoissance made in 1846 and 1847.—X. Report of Lieutenant R. S. Williamson, Topographical Engineers, of Explorations in California in Connection with the Routes near the 35th and 32d Parallels.* Washington. 1855.

2. *A Bill to provide for the Establishment of Railroad and Telegraphic Communication between the Atlantic States and the Pacific Ocean, and for other Purposes. Reported by MR. McDUGAL from the Select Committee of the House of Representatives, March 13, 1854.*

BEFORE the accession of California, the western possessions of the United States were looked upon as a sort of fairy land basking under the influences of a most delightful climate, and enriched by the choicest gifts of Nature. Gigantic herds of

buffaloes, and troops of wild horses of comely proportions and unsurpassed fleetness, roaming at large over pastures whose verdure never paled, were said to meet the eye of the traveller at every turn. Plains of immense extent and unparalleled fatness lay at his feet, while ever and anon rich clumps of woodland, and gently flowing rivulets, invited him to shelter and repose. Farther on these became interspersed with hills and ravines, highly picturesque in effect, terminated in the remote distance by the snow-clad elevations of the Rocky Mountains, which were again succeeded by gentle slopes of arable land, whose western limits were washed by the waves of the Pacific.

Such were the descriptions brought back by the Santa Fe traders who made their annual commercial pilgrimages from the western confines of Missouri, to New Mexico, and by the more adventurous travellers who, from love of novelty or fondness for a roving life, left behind them the haunts of men to roam at pleasure over these unclaimed and uncultivated regions. The individuals composing these expeditions were the very last to furnish sober and reliable accounts of the country they had recently seen. The spirit of daring adventure or recklessness which induced them to undertake the journey, or at least accompanied them on it, the heightened glow of youthful imaginations, and, more than all, the entire transition from the usual current of their ordinary lives at home, seemed to gild with unreal lustre every object they beheld, and to enhance the pleasure of every recollection. To the hunters and trappers who accompanied these expeditions as guides, this life in the wilderness was scarcely less a second nature than a holiday. All their exploits had been here performed, and if it bore witness to their privation and peril, it testified no less of their deeds of courage and daring. They were really attached to it, and never so happy as when sitting over the camp-fire, at the conclusion of the day's journey, narrating to willing ears the part which they had personally enacted in the romance of border-life, doubtless in most instances highly colored by the vividness of their own fancies. What more natural than that the descriptions of a country obtained from such sources should be tinged with the rich hues imparted by the autumn sunset to a distant landscape?

The recent exploring expeditions, sent out under the auspices of the government, have enriched us with a more accurate knowledge of this country, and unfortunately, perhaps, have dispelled many illusions hitherto entertained respecting it. The vast plains indeed exist, but in many instances the salubrity of their climate and the fertility of their soil are more than called into question. Herds of buffaloes are yet encountered, but they are frequently seen scouring an arid waste for miles, amid dense clouds of dust, in search of a short buffalo-grass. Clumps of woodland and running streams there are, but the traveller must look long and well, and man himself to undergo severe fatigue, before he leaves the grateful protection or refreshment of one for the shelter of the next. The immense chain of mountains which divides the waters of the valley of the Mississippi from those of the Pacific, and which appears so beautiful and picturesque in the distance, is found, on a near approach, to be both grand and dangerous. With a base stretching for hundreds of miles, and peaks whose lofty summits are wreathed in the snows of eternal winter, the traveller who has hitherto endured fatigue and privation has now to encounter in crossing it perils of no ordinary character, and such as might well appall a strong arm and a firm will.

The plain to which we have alluded as intervening between the Rocky Mountains and the borders of the Western States is, strictly speaking, a broad plateau rising from east to west by a pretty regular ascent to 5,200, and in some places to 10,000 feet, varying according to the point of approach. It recedes from this altitude towards the Pacific, not by a regular descent, as on the Mississippi slope, but by a series of basins from 1,000 to 3,000 feet below one another, and interspersed by mountain ranges, pursuing different directions. From this crest, which divides the country between the Mississippi and the Pacific into two unequal portions, the loftier peaks of the Rocky Mountains rise, oftentimes abruptly, to an enormous height.

From the western border of Missouri and Arkansas, this plateau presents the same features recognizable within their limits, for a distance of from two to four hundred miles. Af-

terwards its character very materially changes. The entire plain, for six hundred miles, is a gentle, undulating prairie, rising towards the Rocky Mountains. The soil, however, which for two or three hundred miles has the same rich and fertile appearance with that within the States, gradually becomes sandy, dry, and less fertile. The long, waving grass of the east is supplanted by short, thick tufts, known as buffalo-grass; clumps of timber are met with at rarer intervals, water becomes scarce, and the soil, composed of hard clay, intermixed with sand, with but an inch or two of vegetable mould, is seldom moistened by refreshing showers. As the plain approaches the mountains, the traces of vegetation become still more rare, timber almost entirely disappears, the buffalo-grass, which has supplanted the richer herbage of the more fruitful land lying contiguous to the settlements, is in its turn succeeded by a growth of wild sage, almost the only plant which flourishes in this sterile region, and water away from the water-courses is so scarce, that it becomes a serious question with the traveller, in setting out upon his day's journey, where he can find the next supply.

These are the chief features presented by the Mississippi slope, and these do not appear to differ materially in any latitude in which they have been examined, but stretch with tolerable regularity from Mexico on the south to the limits of the territory of the United States on the north. It consists, in fine, of a belt of extremely fertile land of from two to three hundred miles in width, succeeded by nearly double that width of what may not inaptly be termed a desert, possessing neither the means of inviting, nor the power of sustaining, any considerable population. Occasionally fertile spots, watered by streams, or hidden in secluded valleys, burst upon the eye of the traveller, deriving an additional beauty from the universal sterility which surrounds them. These, however, form too inconsiderable a portion to enter into an estimate of the general character of the country.

On entering the mountain region which succeeds the Mississippi slope, the scene is changed. The country is broken and uneven, it rises with greater rapidity, and valleys covered with a luxuriant growth of grass are here and there inter-

spersed among the uneven surfaces. These valleys are usually small, but are sometimes found of considerable extent, and of a very variable character, as to fertility. Indeed, like the plateau which we have just described, this mountain-region may be classed as one of extreme sterility, composed, in some instances, of sandstone, upheaved, broken, and rent asunder in every direction, forming chasms and deep ravines, which occasionally become the beds of streams, and in others of trap, porphyry, and basalt, the latter frequently rising in the form of huge turrets and pinnacles to an enormous height. Ever and anon the traveller is both surprised and delighted to find in his rugged and toilsome pathway a lake studded with small islands, and encompassed upon every side by tall precipices, presenting a scene of the wildest and most picturesque beauty. These lakes are of such frequent occurrence, that they have been found by every exploring party which has crossed the mountains, and are always spoken of in their notes with the utmost enthusiasm. Such scenes of intramural beauty, or even the more magnificent and extended views the traveller is occasionally enabled to obtain from commanding points, furnish but slight remunerations for the daily toil he is obliged to undergo in threading these rugged mountain passes, or in traversing the equally inhospitable plains which lie enclosed within them.

Beginning at the elevated latitude of 49° , the first of these great plains is that enclosed between the Cœur d'Alene and Bitter Root spurs of the Rocky Mountains on the east, and the Cascade Mountains upon the west, known as the great plain of the Columbia. This is a table-land whose width is about two hundred miles, and whose surface, with rare exceptions, is entirely destitute of trees. The soil, a part of which lies upon the trap formation, is rocky, sandy, and sterile. Save those parts which lie in immediate contiguity with the mountains, it is entirely uncultivated. Even in those localities so circumstanced as to be enriched by the *débris* of the mountains, and irrigated by the streams which flow from them after occasional showers, it is more than questionable whether the capacity for agriculture is not limited to a mere growth of grass.

Passing southward to latitude 42° , we enter the great basin of Salt Lake, extending from the Rocky Mountains on the east to the Sierra Nevada on the west, a distance of more than five hundred miles. The whole of this vast territory may be described as offering but few inducements to the emigrant, either in climate or in adaptation to agricultural pursuits. It is estimated that not more than one tenth of its whole extent is susceptible of cultivation, and this is almost entirely in the occupancy of the Mormons. With this reservation, the whole basin is so exceedingly sterile, that it is either wholly bare of vegetation, or scantily covered with wild sage.

Southeast from the basin just described, and separated from it by the Wahsatch range of mountains, is another even more sterile, reaching to the Sierra San Juan. This is a dreary desert almost entirely overlaid by sand, and, with the exception of a few isolated spots, utterly unsuited for the abode of man. The general appearance of the surface, where it is not broken, rocky, or mountainous, is dry and light, like an ash-heap in friability, and entirely denuded of vegetation, except that a little bunch-grass is found scattered over the hills, and sometimes the streams are bordered by a growth of wild sage. The soil in this valley, as well as in those we have already described, is strongly impregnated with an alkali which is in the highest degree destructive to vegetation ; and yet, by a strange anomaly, the party who traversed it under the command of Lieutenant Beckwith found in their marches small spots of pasture-ground surpassing any they had seen in the mountain regions.

Following the course of the Colorado River, which pursues a southwesterly direction, one enters the Colorado desert. This extends from the base of Mount San Bernardino to the Gulf of California, a distance of about one hundred and fifty miles. Its width from east to west is variable, but is in some places seventy miles. Of the general character of this desert, Professor Blake remarks :—

“ Before I reached the surface of the desert, I had been accustomed to regard it as a vast plain of gravel and sand, and supposed that the latter was so abundant and deep as to impede the progress of animals and wagons. This, I believe, corresponds with the general impression

regarding the desert. Instead, however, of the whole plain being composed of loose and sandy materials, we have already seen, by the description previously given, that its basis is a compact blue clay, that, in many cases, has a smooth, floor-like surface, so hard that the passing of mules and wagons scarcely leaves tracks upon it. This clay is alluvial, and forms the delta of the Colorado. It extends northwardly from the head of the Gulf of California as far as the base of the mountain of San Bernardino. The evidence which this alluvial formation affords of the geologically recent submergence of the desert will be subsequently considered.

"There are extensive portions of the desert-surface that are paved with drift-boulders and fine gravel and pebbles. These materials are principally confined to the slopes from the mountains bordering the desert, and to the upper plain, lying to the northward of the emigrant road. This gravelly surface is not loose and porous, but appears to be impacted and condensed, so that it makes a good road for wagons."—*Preliminary Geological Report*, p. 42.

The foregoing brief topographical description embraces within its scope the greater part of the territory lying between the States and the Pacific. With the exception of a few limited tracts of fertile land, it is shown to consist of mountain precipices and barren plains, unsuited alike to agricultural pursuits and to dense occupation. Through a country at present uninhabited, and thus restricted in its capacity to sustain a population, it is proposed to construct a railway which shall connect the waters of the Pacific with those of the Atlantic. It is not too much to say, that, even in our age of bold enterprises, this project is the boldest, its aims are the most comprehensive, and the means required for its completion the most gigantic, of any yet contemplated.

While the government explorations, on the one hand, have sadly disappointed us as to the character and agricultural value of our Western possessions, they have, on the other, clearly demonstrated the feasibility of constructing a railroad across the ranges of mountains which intervene between the Mississippi River and the Pacific, with no more serious obstacles than were encountered, and successfully overcome, in the construction of similar works across the Alleghany Mountains.

These explorations embrace five distinct routes, and cover
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a section of country extending from the 32d to the 49th parallels of north latitude. Governor Stevens was intrusted with the examination of the most northerly route, running from St. Paul to Vancouver, near the 47th and 49th parallels. He was peculiarly fitted for this duty. Prior to his appointment to the governorship of Washington Territory, he had, as assistant to the chief of the Coast Survey, the entire administrative charge of this complex corps; and it is no mean praise to say, that his methodical arrangement and admirable discipline were so complete, as to insure the greatest amount of uniformity in their labors, and to call forth from his superior the highest encomiums in that important department of philosophical and practical research. He was known to possess high intellectual attainments, excellent powers of observation, and an admirable faculty for discipline. Much, therefore, was expected of him, and, as a substantial contribution to our knowledge of the general features of a new and imperfectly explored section of country, his ponderous volume of six hundred pages has not disappointed the public expectation; but it has signally failed to point out inducements sufficiently weighty to cause the route reconnoitered by him to be seriously considered for one moment. This result, however, is due to the character of the country rather than to the party who took cognizance of it, who, in all departments of inquiry, exercised a zeal worthy of high commendation. It is true, that, in minuteness and exact observation, the joint labors reported in this volume fall far short of the admirable observations made under the superintendence of M. Nicolet. In instituting a comparison between the labors of Stevens and Nicolet, it must, however, be remembered, that those of the former were, from their very nature, hurried and desultory, embraced a wider field of observation, and were more limited in time, than those of the latter. The route explored by Governor Stevens is one whose geographical position would have precluded its adoption except in the absence of other practicable routes. Apart from its inherent difficulties, the cost of construction, high northern latitude, cold climate, and inhospitable territory, its termination on the Pacific is so far removed from the centre of trade upon

that ocean, as to constitute not only a serious, but an insurmountable, objection to its adoption.

The next route in geographical order is that pursuing a line near the 41st and 42d parallels of north latitude, and which, like all the routes except the one already noticed, it is proposed to terminate at San Francisco. The portion of country lying between the Missouri River and Fort Bridger has never been explored with special reference to a railroad. The information we possess of this portion of the route is derived from the reports of Colonel Fremont and Captain Stansbury. Lieutenant Beckwith, who was charged with the duty of making the explorations between Fort Bridger and the Pacific, conducted his labors with judgment and zeal, and terminated them with satisfactory results. This route possesses many advantages, and its examination somewhat in detail may not be out of place.

Two different starting-points are proposed, one at Council Bluffs on the Missouri River, in latitude 40° , the other at Westport, which is situated at the confluence of the Kansas and Missouri Rivers, in latitude 39° . The more northerly starting-point would, if a continuous railroad were contemplated, connect with a line terminating at Chicago. The more southerly would follow the course of the Missouri eastward to St. Louis. Pursuing a westerly direction from either of these starting-points, the surveys would connect on the Platte River near Fort Kearney, in longitude 99° . From this point, the route would ascend the Platte and pass through the Black Hills, or the eastern chain of the Rocky Mountains, either by the North Fork of the Platte and its tributary, the Sweet-Water, or the South Fork of the Platte. Both of these contemplated surveys would again meet at Fort Bridger, and thence follow the line indicated by Lieutenant Beckwith, by the Great Salt Lake, the valley of the Humboldt River and Fort Reading, to San Francisco.

The agricultural character of this route has, for the most part, been anticipated in the general statement already given. One word in relation to its geological character. Westward from the confluence of the Kansas and Missouri, the prevailing rock for three hundred miles is limestone, often rich in

organic remains. The limestone formation in the neighborhood of Westport is blue and hard. This is followed by a limestone of a soft character and yellow color, and this again by a gray, hard sub-crystalline limestone. In longitude 100° , and near the junction of the Republican Fork with the Kansas, a range of low hills is found (also of limestone), which appear to have been the limits of a former bed of water, most probably an ancient lake of considerable extent. The lines which mark the banks of this lake do not always conform to the curvatures of the hills, which extend as far south as the North Fork of the Red River, and perhaps still farther. The gravelly and sterile soil which succeeds the fertile land of the limestone formation is imposed upon a sandstone abounding in organic remains, which shows itself at numerous points where creeks and rivers have cut their channels through it. Beneath the sandstone is a hard, fine-grained rock of a yellow color, which, like the sandstone, is often found disintegrated by atmospheric agency.

The first cascades on entering the mountain region fall over a ridge of granite. The principal rock, however, is a fine-grained sandstone, firmer than that of the plain, and white. Plutonic action has rent this asunder, scattered its huge masses in all directions, and upheaved the great body of it nearly to a vertical direction. At the base of the higher mountains, drifts of quartz and porphyry occur. The peculiar character of the more lofty mountain-peaks is imparted to them by trachytic porphyry. This porphyry is of a dark gray color, interspersed, particularly at the base of the mountains, with crystals of felspar and black mica. Some of the specimens collected by the expedition are very beautiful, and contain crystals of felspar, from one to two tenths of an inch in size. As the mountain range is penetrated still farther, the porphyry continues, but the crystals of felspar become more rare, and the mica seems to be transformed into tourmaline. Granite, gneiss, sandstone, and blue limestone also present themselves, not regularly, but often in confused masses, as if torn from their original connections by intense Plutonic agency, forming a chaotic mass, always rugged and wild in appearance, and sometimes affording views of peculiar grandeur.

The entrance into some of the valleys, whose sides are of the true trap formation, is beautiful in the extreme. As it presents itself in these situations, the trap is usually abrupt, steep, and frequently vertical. Portions of the least exposed sides are covered with vegetation, which presents a charming contrast to the rugged walls, of red trap porphyry, which not unfrequently rise in majestic grandeur to the height of three or four thousand feet. Immediately west of the valley of the Great Salt Lake, the mountains consist of a limestone of the coal formation. Above this, a conglomerate furnishes the base upon which rest irregular peaks of porphyry and granite. In a westerly direction, this limestone not unfrequently presents itself, and in the Humboldt Mountains it constitutes one of the main features of the chain, showing itself on the summits of the highest peaks in all those irregular and fantastic shapes which, when exposed in lofty elevations to a warfare with the elements, it is known to assume.

After crossing the Humboldt Mountains, granite, sienite, and quartz constitute the principal rocks; but the closer the approach to the Sierra Nevada, the more do the volcanic rocks take the place of others, until at last they prevail almost exclusively. One of the most remarkable rocks found in the vicinity of the Humboldt Mountains consists of a mixture of agate, chalcedony, and jasper, fused together by volcanic action. This occurs in abundance, in a gorge named by Dr. Schiel, from the circumstance of its presence, Agate Cañon. This rock possesses both beauty and hardness. It is susceptible of a high degree of polish, and under such circumstances reveals rich and variegated tints, admirably adapting it to the purposes of the lapidary. It is highly probable that it may yet subserve some useful, or at least ornamental, purpose in the arts.

The formation of the Sierra Nevada is almost entirely composed of rocks of the newer series, as basalt, phonolite, and trachyte. The latter occurs in greatest abundance, and, with its associates, entirely displaces the granite, gneiss, and even the sandstone which we have traced from our first entrance into the mountains up to this point, although farther south this chain is rich in those formations. On every side,

evidences of volcanic action are met with, which give not only character to the rock, but form and peculiarity to the mountain peaks.

"The highly interesting scenery around the so-called 'Black Butte,' bears, of all the parts of the Sierra Nevada we passed over, most strikingly the character of a volcanic country. Surrounded by elevated peaks and high cliffs, and quite isolated, stands a mountain, from eight hundred to a thousand feet high, of conical shape, and formed of black lava, apparently a monument of the latest disturbing forces in these regions. The lava is in some degree decomposed at the surface, and the butte, as well as the soil around, is covered with volcanic sand, and blocks or small pieces of that lava. In the cliffs on the west side of the butte, the lava passes gradually into trachyte. The summit of this mountain butte is rounded, and no opening in it is perceptible from below."—*Schiel's Report*, p. 131.

This geological sketch of the country traversed by the middle railway route will serve the twofold purpose of informing the reader what particular strata occur on the line and may be made subservient to railway construction, and of enabling him, without further detail, to arrive at tolerably correct conclusions as to the mineral character of the country north and south of this section. It is true that each district of slope or mountain is stamped by its own peculiarities, requiring separate examination and description for accurate detail; but notwithstanding this diversity of structure in particular localities, the main features of the whole country will be found to bear so marked an identity as to render the deductions made from such a vast and comprehensive generalization as is here attempted somewhat reliable, at least sufficiently so for a cursory view. The duty of making a general geological survey of the whole country lying between the Mississippi River and the Pacific, has been assigned to Professor Blake, who has already distinguished himself by his geological observations on the great desert and the surrounding mountain country. The field is both rich and comprehensive, and with the zeal which has hitherto characterized his labors, we have reason to hope that he may add largely to his present reputation and to geological science.

In addition to the geographical notice already given, it

may be proper to state, that, after passing the 99th meridian, the only extensive body of cultivable land on the whole route is that embraced in the Great Basin, and in the possession of the Mormons. The entire area of soil susceptible of cultivation is one thousand one hundred and eight square miles. About one tenth of this can be cultivated either without irrigation or with unexpensive works; the remainder would require costly works to develop it. The Mormons have congregated in these rocky fastnesses to the number of twenty-seven thousand, and have appropriated to themselves every acre of arable land in the whole basin. It is hardly to be supposed that, with the peculiar views entertained by them in regard to the possession of territory, which rendered them so unpleasant neighbors in Illinois and Missouri, they would quietly submit to any inroads on their territorial rights. Were this region capable of sustaining a large population, a curious problem in political economy would soon need to be solved. As it is, there is every probability of their being left in undisturbed possession of their present home, until such time as they determine this question for themselves.

The distance by this route from Council Bluffs to Benicia, the western terminus near San Francisco, is 2,032 miles, its sum of ascents and descents 29,120 feet, and its estimated cost \$ 116,095,000. From Council Bluffs or Fort Leavenworth to the entrance into the Black Hills, a distance of about 600 miles, the ascent would average about 40 feet to the mile, and the route would not vary materially from any of the others between the Mississippi and the Rocky Mountains. This part of the route may be considered as possessing great advantages for the construction of a railroad. Its chief disadvantage consists in the inadequate supply of timber along the whole line, and the almost entire absence of it in the desolate region west of longitude 99°. After entering the Black Hills, this route has peculiarities and difficulties of its own. From the first gorge in these mountains until the summit of the pass is attained, a distance of 291 miles, the work resembles that of the Baltimore and Ohio Railroad in its passage through the Alleghanies, and would be both difficult and expensive. From the pass to Fort Bridger, the work would be

somewhat less expensive, yet similar in character. The elevation at Fort Bridger is 7,490 feet. The distance from Council Bluffs is 942 miles; from Fort Leavenworth, 1,072 miles.

From Fort Bridger the route ascends the water-shed between the waters of Green River and those of the Great Salt Lake, with grades of from 40 to 60 feet per mile, and, after following the White Clay Creek to its junction with Weber River, proceeds with this latter stream, through a wild and precipitous gorge in the Wahsatch Mountains, into the valley of the Great Salt Lake. This gorge, which is extremely narrow and rugged, furnishes one of the chief obstacles to the construction of a railroad, but the difficulties, although great, are not insurmountable.

The route from this point to the Humboldt Mountains, a distance of 600 miles, lies across the Great Salt Lake valley, and may be easily pursued. The Humboldt Mountains are entered by a pass, which extends nine miles, and opens upon the Humboldt River. The steepest grade in this pass is 89 feet to the mile, for eight miles. A descent is made thence into the valley of the Humboldt River. This stream is followed for 190 miles, and is then left to pursue a line to Madelin Pass in the Sierra Nevada chain, a distance of 119 miles. From this pass the plateau of the Sierra Nevada, a plain about 40 miles from east to west, covered with isolated peaks and irregular ridges, and about 5,200 feet above the level of the sea, is reached. After crossing this plain another descent is made into the valley watered by the Sacramento River, whose course is followed, between the Sierra Nevada and the Coast Mountains, to Benicia, the terminus of the road.

So far as mere location is concerned, this route possesses advantages far above all others. The possibility of constructing a railroad 2,000 miles in length, across a mountainous country torn asunder and upheaved by volcanic agency, bristling with lofty summits, and cut up by deep and apparently impassable chasms, without a single tunnel or a grade above 100 feet in the mile, seems scarcely credible. Yet such is the result of Lieutenant Beckwith's explorations, a result in which those who know him best repose entire confidence.

From the description already given of the agricultural capabilities of this route, it may readily be imagined that timber is extremely rare, and difficult of attainment. Fuel for the use of the working parties may possibly be procured in most places along the line. Timber for cross-ties and lumber is found only at intervals from two to seven hundred miles apart. No reliance whatever can be placed on fuel for the use of locomotives at any part of the route. Indeed, the propriety of planting young forests for future consumption is a matter which has gravely entered into the consideration of those whose attention has been called to the subject.

The route near the 38th and 39th parallels of latitude, which is wholly impracticable, was prosecuted from the mouth of the Kansas to Sevier River in the Great Basin, where the explorations were suddenly terminated by the murder of Captain Gunnison and several of his associates by the Indians, toward whom he had manifested great kindness, and with whom he supposed himself on the best of terms. Captain Gunnison, with Messrs. R. H. Kern, F. Creutzfeldt, William Potter, and John Bellows, and an escort of a corporal and six men, left the camp for the purpose of exploring the vicinity of Sevier Lake, thought to be some 18 miles distant. On the morning of the following day, the corporal of the escort came reeling into the camp, weak and exhausted, scarcely able to communicate, except in a few broken sentences, the sad news that Captain Gunnison and his party had been surprised by the Indians in their camp, and that those who were unable to escape were all butchered.

The details of this sad catastrophe are given in the words of Lieutenant Beckwith, his second in command.

"Captain Gunnison had encamped early in the afternoon, while the wind and storm were yet fresh, and doubtless feeling the security which men come to indulge after passing long periods of time surrounded by savages without actually encountering them. The abundant grass and fuel of a little nook in the river-bottom, sheltered by the high second bank of the river on one side, and thick willows, distant scarcely thirty yards, on two of the others, with the river in front, offering a tempting place of comfort and utility, which was perhaps accepted without even a thought of danger. It was known to the party that a band of Indians

was near them, for we had seen their fires daily since entering the valley ; but an unusual feeling of security against them was felt, as Captain Gunnison had learned that a recent quarrel, resulting in several deaths, which they had had with the emigrants, had terminated, and that, notwithstanding this difficulty, they had remained at peace with the neighboring settlers, which had been confirmed and guaranteed for the future in a ‘ talk’ held with some of the Indians of this band, by an agent of the Governor of the Territory, during our stay near Fillmore. This information, Captain Gunnison told me before leaving, relieved him of any apprehension he might otherwise have felt regarding this band, and which was the reason for having asked for so small an escort to accompany him, which his guide, an experienced citizen of the Territory, deemed sufficient.

“ The usual precaution of a camp guard had been taken, each of the party (including the commander) in turn having performed that duty during the night. At the break of day all arose, and at once engaged in the usual duties of a camp preparatory to an early start, to reach that day the most distant point of exploration for the present season. The sun had not yet risen, most of the party being at breakfast, when the surrounding quietness and silence of this vast plain was broken by the discharge of a volley of rifles and a shower of arrows through that devoted camp, mingled with the savage yells of a large band of Pah-Utah Indians, almost in the midst of the camp ; for, under cover of the thick bushes, they had approached undiscovered to within twenty-five yards of the camp-fires. The surprise was complete. At the first discharge, the call to ‘ seize your arms ’ had little effect. All was confusion. Captain Gunnison, stepping from his tent, called to his savage murderers that he was their friend ; but this had no effect. They rushed into camp, and only those escaped who succeeded in mounting on horse-back, and even then they were pursued for many miles. The horse of one fell near camp, tumbling his rider under a bush, where he lay for six or seven hours, while the Indians were passing him on every side, until finally he could no longer hear them near him or in the camp, when he left, and was met soon afterwards by Captain Morris’s party, which reached the fatal spot just before night. Two Indians were seen near camp by Lieutenant Baker and Mr. Potter, brother of the guide, but they were not able to come up with them before darkness enabled them to escape. The bodies of the slain were not all found at dark, and hope still lingered, as a bright fire was built to assure any survivor of safety. But the long weary night, rendered hideous by the howling of wolves, wore away, as this little band of armed men, barely larger than that which had already been sacrificed, lay near the fatal spot, and

day dawned only to discover the mutilated remains of their recent comrades, none of them being scalped,—a barbarity which some of the tribes on this part of the continent seldom indulge. Some of their arms were, however, cut off at the elbow, and their entrails cut open; and, the wolves having had access to them during the day and to those exposed during the night, their bodies were in such a condition that it was not deemed possible to bring them away,—not even that of Captain Gunnison, who had fallen pierced with fifteen arrows.”—*Beckwith's Report*, p. 82.

The route near the 35th parallel, explored by Lieutenant Whipple, is found to be quite practicable. The reports of this officer and his associates, which are so brief as to be embraced in a volume of forty-three pages, show that the same advantages are found, and the same difficulties met with, as have been delineated in the description of the route near the 41st parallel. The steepest grade upon this route is 100 feet to the mile; many occur of from 40 to 70 feet, and one tunnel three and a half miles in length is required. Timber is scarce, and is met with at intervals of from 100 to 500 miles. The country, after passing the 99th meridian, is generally sterile, and unsuited for dense population at any point. It is at present for the most part uninhabited, and from all appearances is likely to continue for ages an unreclaimed, and in many parts a desert waste. The estimated cost of the work and appointments on this route is \$169,000,000.

The last route to be noticed is that near the 32d parallel of north latitude. The examination of different parts of this route was confided to several different parties. That portion of it from Preston on the Red River to the Rio Grande was assigned to Captain Pope; from the Rio Grande to the Pimas villages on the Gila, to Lieutenant Parke; from the Pimas villages, along the Gila to its mouth, to Major Emory; and from the mouth of the Gila to San Francisco, to Lieutenant Williamson. All of these gentlemen belong to the corps of Topographical Engineers, and great confidence is placed in their respective reports by the chief of the War Department. Indeed, with the exception of the extreme northern route, examined by Governor Stevens, the explorations on this seem to have been conducted with greater care and minuteness than on any of the others.

That portion of the route examined by Captain Pope, from Red River to the Rio Grande, a distance of 646 miles, is naturally divided into three distinct belts. The first belt, from the Red River to the Staked Plain, 352 miles, is described by him as one of great fertility. The Staked Plain, which constitutes the second belt, is 125 miles wide, and has an elevation of 4,500 feet. It is a barren plain, at certain seasons entirely destitute of water and vegetation, and without trees. Between this plain and the Rio Grande, 163 miles, the country is divided by ridges of mountains into three valleys, or rather plains; for the mountains in this section of the country are not succeeded, as is usual, by corresponding valleys. These table-lands, although destitute of wood and water, are covered by a rich growth of luxuriant grass, which adapts them for pasturage. It is questionable whether any part can be relied on for cultivation.

"The space between the eastern base of the Staked Plain and the Red River, at the parallel of 34° , is occupied by that portion of Northern Texas drained by the tributaries of the Colorado, the Brazos, the Trinity, and the Red Rivers. With rapidly increasing advantages as you proceed eastward from the Llano Estacado, this region is well timbered, well watered, and possessed of a soil of extreme fertility, capable of sustaining a dense population. The entire country is so gently undulating in its surface, and presents such an abundant and well-distributed supply of wood and water, that it can be traversed in any direction with trains of wagons, and is of so genial a climate that little choice of the season is considered desirable in undertaking an expedition through it. A great portion of the timber of the region intersected by the Colorado and its tributaries along this route is the mezquite, which, about thirty feet in height, and from six to ten inches in diameter, divides about equally with the prairie lands this entire district of country. The Brazos and its tributaries are better supplied with oak timber of a larger size; the country is more undulating, and the water more abundant. Immense coal-beds, of good quality, crop out along the valley of the river, and every natural advantage of soil and climate is offered to the emigrant. A military post (Fort Belknap) has been established upon this stream, near the $33d$ parallel. But by far the richest and most beautiful district of country I have ever seen, in Texas or elsewhere, is that watered by the Trinity and its tributaries. Occupying east and west a belt of one hundred miles in width, with about equal

quantities of prairie and timber, intersected by numerous clear, fresh streams and countless springs, with a gently undulating surface of prairie and oak openings, it presents the most charming views, as of a country in the highest state of cultivation; and you are startled at the summit of each swell of the prairie with a prospect of groves, parks, and forests, with intervening plains of luxuriant grass, over which the eye in vain wanders in search of the white village or the stately house, which seem alone wanting to the scene.

"The delusion was so perfect, and the recurrence of these charming views so constant, that every swell of the ground elicited from the party renewed expressions of surprise and admiration.

"It may seem strange that a region suggestive of such florid description should still remain so nearly uninhabited; but it must be remembered that this part of Texas is yet but partially explored, that it is far from the markets, and that it is still infested by bands of hostile Indians. A full knowledge of its startling beauty, and of its amazing fertility, and the construction of facilities of communication with a market, will soon convert this charming region into a reality, of which nature has exhibited so beautiful a presentment.

"Over a very gentle dividing ridge we descended upon the tributaries of the Red River, and a great increase in quantity and size of timber was immediately apparent. At least four fifths of the country drained by the tributaries of Red River are covered with timber, and of a size and quality to be favorably compared with any timbered region on this continent.

"The immediate valley of Red River is from two to five miles in width, without prairie in its whole extent in the neighborhood of Preston, covered with large timber of every description, and possessed of a soil of amazing fertility. At some points the surface is covered with a white or red sand, about three inches in depth, below which is a fat, dark, vegetable mould, from three to six feet thick, and of the most astonishing richness.

"The valley is being rapidly settled by cotton-planters from Tennessee and Mississippi; and although the immediate bottom-lands along the river are exceedingly difficult of settlement and culture, from the immense size and quantity of the timber, they are nevertheless preferred to the prairie lands in the vicinity, in consequence of the exceeding fertility of the soil. The river, at the 34th parallel, is about eight hundred yards wide, and is susceptible of steamboat navigation for five or six months of the year.

"Proceeding from this point to the eastward, over a country well watered, well timbered, and of great fertility, and inhabited by whites

and partially civilized Indians, who cultivate the soil, we reach, at a distance of one hundred and fifty miles, the western frontier of Arkansas.

"Of the seven hundred and eighty miles of distance from the western line of Arkansas to the valley of the Rio Grande, at El Paso, nearly five hundred miles traverse a fertile, well-watered, and abundantly timbered region; and of the remaining two hundred and eighty, one hundred and sixty are through a country which, although of little agricultural value, except in the immediate valley of the Pecos, is nevertheless admirably adapted to the raising of stock, and offers every desirable facility for travel, at any season of the year." — *Pope's Report*, pp. 15, 16.

That part of the route examined by Lieutenant Parke, between the waters of the Rio Grande, which find their way into the Gulf of Mexico, and those of the Rio Gila, which flow into the Gulf of California, is an elevated and barren plain, whose continuity of surface is here and there interrupted by rugged, isolated mountains, having apparently no connection with any other chain or system. These mountains, like the plain from which they spring, are bleak and bare, and are denominated, from their isolated position, the Lost Mountains. To the eye the plain appears level, but the profile shows that it has in fact an undulating surface, constantly rising and falling, so as to form a series of basins, seven in number. The most elevated point of these basins is generally 400 feet above the most depressed point, although in one instance an altitude of 850 feet is reached, and in another 1,200 feet. The mean elevation of this plain above the level of the sea is 4,700 feet; the highest point, which is in the Chiricahui range, is 5,180 feet.

The survey by Lieutenant Williamson, from the Rio Gila to the Pacific, indicates the pass of San Gorgonio as that best adapted for the purpose, and San Diego and San Pedro as the points on the Pacific most easily reached. San Diego is the more southerly point, and has the best harbor; that of San Pedro being an open roadstead, and exposed to the full force of the northwest winds, which on the Pacific are the most violent. From this point it is possible, and entirely practicable, to construct a road to San Francisco. Explorations and

estimates were made by Lieutenant Williamson for such an extension.

The agricultural character of the route from the Rio Grande to San Diego may be deduced from the following summary by Lieutenant-Colonel Emory.

"The country from the Arkansas to this point, more than twelve hundred miles, in its adaptation to agriculture, has peculiarities which must for ever stamp themselves upon the population which inhabits it. All of North Mexico, embracing New Mexico, Chihuahua, Sonora, and the Californias, as far north as the Sacramento, is, as far as the best information goes, the same in the physical character of its surface, and differs but little in climate or products.

"In no part of this vast tract can the rains from heaven be relied upon, to any extent, for the cultivation of the soil. The earth is destitute of trees, and in great part also of any vegetation whatever.

"A few feeble streams flow in different directions from the great mountains, which in many places traverse this region. These streams are separated, sometimes by plains and sometimes by mountains, without water and without vegetation, and may be called deserts, so far as they perform any useful part in the sustenance of animal life.

"The cultivation of the earth is therefore confined to those narrow strips of land which are within the level of the waters of the streams, and wherever practised in a community with any success, or to any extent, involves a degree of subordination and absolute obedience to a chief, repugnant to the habits of our people.

"The chief who directs the time and the quantity of the precious irrigating water must be implicitly obeyed by the whole community. A departure from his orders, by the waste of water or unjust distribution of it, or neglect to make the proper embankments, may endanger the means of subsistence of many people. He must, therefore, be armed with power to punish promptly and immediately.

"I made many inquiries as to the character of the vast region of country embraced in the triangle formed by the Colorado of the West, the Del Norte, and the Gila; and the information collected will, at some future time, be thrown into notes for the benefit of future explorers, but are not given in this work, as I profess to write only of what I saw.

"From all that I learn, the country does not differ materially in its physical character from New Mexico, except, perhaps, being less denuded of soil and vegetation. The sources of the Salinas, the San Francisco, Azul, San Carlos, and Prieto, tributaries of the Gila, take

their rise in it. About their head-waters, and occasionally along their courses, are presented sections of land capable of irrigation.

"The whole extent, except on the margin of streams, is said to be destitute of forest-trees. The Apaches, a very numerous race, and the Navajoes, are the chief occupants; but there are many minor bands, who, unlike the Apaches and Navajoes, are not nomadic, but have fixed habitations. Among the most remarkable of these are the Soones, most of whom are said to be *albinos*. The latter cultivate the soil, and live in peace with their more numerous and savage neighbors.

"Departing from the ford of the Colorado in the direction of Sonora, there is a fearful desert to encounter. Alter, a small town, with a Mexican garrison, is the nearest settlement.

"All accounts concur in representing the journey as one of extreme hardship, and even peril. The distance is not exactly known, but it is variously represented at from four to seven days' journey. Persons bound for Sonora from California, who do not mind a circuitous route, should ascend the Gila as far as the Pimos village, and thence penetrate the province by way of Tucson."

In the construction of a railway by either of the routes indicated, the means of procuring a supply of fuel and water for the use of the road when completed becomes a very important inquiry. In the sketch of the country already given, it is pretty clearly demonstrated that no reliance whatever can be placed upon any part of it for a permanent supply of wood for fuel. Barren and dreary wastes without a sign of vegetation beyond a few stunted bushes, and entirely devoid of the presence of a single tree, are encountered upon every route, and form a principal feature in the scenery. The most that can be expected of these is a precarious supply of fuel for those engaged in the construction of the road, the timber for the work being drawn from the mountain-sides, which here and there, in favored locations, present a forest of respectable size, but which are wholly inadequate to furnish the road with any considerable amount of fuel. Besides, when it is considered that these patches of woodland are separated from one another by hundreds of miles, it becomes obvious that the transportation of wood for fuel from station to station, at such remote distances, must increase its cost to an amount so enormous, as to preclude the possibility of its use for locomotive purposes.

Indeed, so well assured are those who have examined the subject, of the impossibility of procuring a sufficient supply of wood for fuel, that all calculations of running expenses are based upon the theory that coal will be used for locomotive purposes. This must be procured from Puget's Sound on the Pacific, and from the mines of Missouri and Texas on the Mississippi slope. A deposit of coal is said to exist on Green River, but to what extent is unknown. The rocks in which this deposit is found are such as to give a coal of the tertiary formation. As a general rule, the coal of this period is inferior in quality, and could come into general use only in the absence of a better article. The steamers on the Lake of Geneva in Switzerland, however, are supplied with this description of coal, and use it in preference to wood. No examination has yet been made of the Green River coal deposit, to determine the thickness of the seams and the quality of coal. The mere fact that a coal deposit exists on that river is of less importance than at the first view may be imagined. In regard to the American coal-fields, it may be assumed that the deposit is not only greatest in quantity, but best in quality, in the Alleghany Mountains, and that as it recedes westward it becomes earthy and in all other respects inferior. The State of Iowa is said to contain twenty-five thousand square miles underlaid by the coal formation, and yet not a single seam in the whole of this vast deposit is known to exist over three and a half feet in thickness, or one which from its quantity and quality is likely to induce capitalists to embark any considerable sum in its development and working as a commercial operation. This single illustration is sufficient to show how little reliance is to be placed on the mere announcement that coal exists on Green River. When it is taken into consideration that one fifth of the entire working expense of a railroad is chargeable to the fuel account, it may be readily seen under what disadvantages a long line of railroad would be operated, which drew its supply of fuel from sources so remote as largely to enhance its price at either terminus, and which had no intermediate source of supply.

It is possible to procure fuel, at great expense, remote from

a railroad, but water cannot be so obtained. It must be found at fixed points, as it is needed along the line of the road, and hence the means of procuring an adequate amount of water becomes even a more important inquiry than that of fuel. This question has not yet been satisfactorily answered. The vast arid wastes over which the road must necessarily find its way, stretch for hundreds of miles without the presence of any considerable stream. Refreshing showers seldom fall in these elevated plains, and mountain streams are rapidly absorbed by the parched earth of the less elevated lands. The streams found in the basins enclosed by ranges of mountains on either side, frequently lose themselves or become subterranean. Soon after emerging from the rocky chasms in which they are collected, they commonly spread themselves over a large surface, and disappear in the broad belts of sand and gravel which they traverse. It sometimes occurs that they reappear after their subsidence into the earth, and alternately are lost and visible for several miles, until completely absorbed. This phenomenon has led Dr. Blake to the conclusion, that a considerable amount of water may be collected by sinking wells. The peculiar position of the strata, most of which have a decided inclination, together with the success met with at San Francisco and in its neighborhood, have inclined him to the opinion, that the necessary amount of water for the uses of the road, in case of the failure of ordinary wells, may be obtained from Artesian wells by boring.

This view of Dr. Blake coincides with that expressed by Dr. Parry, the geologist to the Mexican boundary survey.

"The natural supplies of fresh water for these open wastes are derived from uncertain accumulations of rain-products in small reservoirs, or occasional permanent springs, the latter generally occupying situations in close proximity to mountain ranges.

"All these basins not directly connected with the Rio Grande valley receive and absorb the drainage of their respective mountain boundaries, except in the higher elevations, rarely showing running water, unless as the temporary result of local rains.

"The above indications are favorable to the formation of aqueous substrata, which may be reached by sufficiently deep boring, and when

located at the lower depressions of these basin areas, the water would necessarily be brought to the surface."

Notwithstanding the opinions above expressed, the whole subject is involved in speculation, and can be satisfactorily determined only by submitting it to the test of actual experiment. A party under the command of Lieutenant Parke is understood to be engaged in making borings on the route surveyed by him, and may be able upon its return to present us with new facts. Whether the water of these desert regions will ever be used for railway purposes or not, the explorations under his charge, and the wells which may be constructed by him, will be of incalculable benefit to those whom fortune or choice may cast as travellers upon these dreary wastes.

Whatever may be the ultimate fate of the railroad, for whose construction these preliminary explorations have been undertaken, there can be no doubt as to the great advantages resulting from the explorations themselves. One of the most important of these is the general knowledge imparted of the vast tract of country subjected to the scrutiny of the various parties sent out under the auspices of the government. It is true that much of the romance which had attached itself to this part of the country in its unexplored state has been dissipated; but in its stead we have an accumulation of facts, which constitute a substantial contribution to our knowledge, and are of much greater importance in determining the course of the hardy pioneer, than any of the ideal descriptions upon which he was previously obliged to depend,—descriptions which but too frequently served to lure him on to certain disappointment, and perhaps to ruin.

Our rich possessions west of the 99th meridian have turned out to be worthless, so far as agriculture is concerned. They never can entice a rural population to inhabit them, nor sustain one if so enticed. We may as well acknowledge this,—and act upon it,—legislate upon it. We may as well admit that Kansas and Nebraska, with the exception of the small strip of land upon their eastern borders, are perfect deserts, with a soil whose constituents are of such a nature as for ever to unfit them for the purposes of agriculture, and are not

worth an expenditure of angry feeling as to who shall or who shall not inhabit them. We may as well admit that Washington Territory, and Oregon, and Utah, and New Mexico, are, with the exception of a few limited areas, composed of mountain chains and unfruitful plains; and that, whatever route is selected for a railroad to the Pacific, it must wind the greater part of its length through a country destined to remain for ever an uninhabited and dreary waste.

ART. IX.—1. *The Poets and Poetry of America.* By RUFUS WILMOT GRISWOLD. Sixteenth Edition, carefully revised, much enlarged, and continued to the Present Time. With Portraits on Steel from Original Pictures. Philadelphia: Parry and McMillan. 1855. pp. 622.

2. *The Poetical Works of AUGUSTINE DUGANNE.* Philadelphia: Parry and McMillan. 1855. pp. 407.

DR. GRISWOLD's well-known book appears, in the sixteenth edition, in a form greatly improved, whether we regard the richness of its materials or its mechanical elegance and beauty. It contains ten well-executed portraits, including that of the compiler. The earlier editions of the work included our female poets, whose writings have since been gathered into a separate volume, leaving void room which has been more than filled by their brethren of the gentle craft. Sixteen introductory pages are devoted to the ante-Revolutionary period, while about one and fifty candidates to the honors of Parnassus are brought before us in the residue of the volume. Of each of these we have a biographical sketch,—brief and skeleton-wise for the recent and still living, sufficiently minute to satisfy curiosity for the earlier names on the list. In these sketches we find reason to admire the author's impartiality and kindness. We have been unable to find a single instance in which he has suffered any of the usual grounds of prejudice to warp his judgment or to scant his eulogy, and where it has been his duty to refer to obliquities of temper and con-